

SECTION 6 - COMMUNICATIONS

6.1 General Introduction

This section provides an overview of the communication options available to Trading Partner(s) planning to implement EDI. Its purpose is to highlight the areas where key data communication decisions must be made. There is no single or preferred solution. Each Trading Partner must determine the proper approach based on current and projected transaction volumes and desired level of investment. Specific communications information for each EPA project is contained in the applicable EDI Project Implementation Guideline.

Communications is the transport of information in an EDI environment and may be by physical or telecommunication means. Physical means include the use of magnetic tape or courier service. Data communication means the use of a public or private telecommunications. Criteria to be considered when determining the communication mode of data transfer include the following:

- C Distance of transport
- C Number of destinations
- C Costs
- C Delivery time frame
- C Frequency of transport
- C Security
- C Volume of transactions
- C Compatibility of media
- C Reliability

Each exchange method should be analyzed to determine whether or not the approach meets the Trading Partners' communication needs. No matter which approach is selected, a contingency plan should be formulated to address the possible event of a communication failure.

Issues to consider are procedures to address system failures, transmission error recovery including establishing the maximum number of retransmission attempts, security, network response time, and error reporting.

6.1.1 EDI Communication Alternatives

Telecommunications moves data between two points by either a dedicated or a switched connection. Dedicated connections are direct permanent links. Switched or dial-up connections are temporary links for the duration of a communication session. The connections may be direct between trading partners or may employ the use of a third party. A third party is a service provider which may provide added services such as routing services, electronic mailboxes, storage, speed and code conversion, and translation. A third party that provides these services is referred to as a Value Added Network or VAN.

An organization's specific EDI transmission requirements will determine the appropriate telecommunications route. To determine the best alternative for your telecommunication needs, consider the following:

- C Number of Trading Partners
- C Volume of transactions
- C Delivery time frame
- C Frequency of transport
- C Compatibility of media
- C Reliability

6.2 Protocols

Protocols are a set of conventions between communicating devices. Simple protocols define only hardware configuration, more complex protocols define timings, data formats, error detection, and correction techniques.

6.2.1 EDI Data Transfer Protocol

Communication capability, security, and data integrity are communication protocol issues to be addressed by EDI trading partners.

Communication Compatibility

- C Electrical Signaling
 - Signaling between communication hardware, modem communication, and channel modem

- Modem types
- Transmission speed compatibility

C Line Control Protocol

- Between communications software, such as asynchronous, binary synchronous, and other protocols
- Call establishment
- Data blocking and organization
- Acknowledgement and signaling for handshaking and error control
- Line turnaround procedures
- Character synchronization
- Escape interrupt disconnect

C Data Transfer Protocol

- Compatible EDI data transfer programs and techniques for managing data transfer

Security

- C** EDI data going only to the intended trading partner
- C** Control over access to communications and business systems
- C** Identification and authorization of trading partners
- C** Authentication

Data Integrity

Data Transfer Process Integrity refers to the actions taken to prevent problems. An objective of the EDI communication system is to provide a high degree of data process integrity to:

- C** Minimize potential loss of data by providing intermediate safe storage, interchange authorization, retransmission approval, and mutual results commitment.

- C Minimize the potential for data duplication by providing temporary data suspension
- C Minimize the potential for situations that require human intervention by providing status retention and transfer restart capabilities.

Error detecting protocols should be considered as the minimum communication requirement for EDI. Asynchronous and binary synchronous communication protocols provide error handling techniques based on the specific implementation.

6.2.2 Transmission Protocols

Transmission or data link protocols are either character-oriented or bit-oriented.

- C ***Character-oriented protocols*** use a particular code set for transmission with some of the characters in the code set reserved for control functions. Asynchronous and binary synchronous protocols are examples of character-oriented protocols.
- C ***Asynchronous protocol*** is synchronized by sending and receiving Data Transmission Equipment (DTE) before each character is sent. Each character has a start and stop bit to indicate beginning and end of each character. The start and stop bits are the mechanism by which synchronization is established. Typical asynchronous communications accommodated by microcomputers are transmitted at a baud rate ranging between 300-9600 bits per second (BPS). Asynchronous accuracy is inversely proportional to the speed of the data transfer. Higher levels of accuracy can be obtained through the use of XMODEM, KERMIT, and others.
- C ***Binary synchronous*** or bi-sync bit synchronization is established for a much longer duration, usually for the time it takes to transmit several thousand bits. This results in less transmission overhead but requires more complex circuitry. Typical binary synchronous communication is transmitted at a baud rate ranging between 2400-9600 BPS. Binary synchronous accuracy is not dependent on the speed of the data transfer.
- C ***Bit-oriented protocols*** are independent of any particular code set and no character codes are reserved for control functions. High Level Data Link Control (HDLC) and Advanced Data Communication Control Procedures (ADCCP) are examples of this protocol. The major advantages are in speed and standardization.

6.3 Point-to-Point

Point-to-point or direct connect service is communication between two trading partners. Point-to-point may employ dedicated circuits, or dial circuits, or a combination, of the two. The type of circuit used depends on a number of factors, two of which are volume and speed or timing of the transmissions. An EDI user that elects direct communication with trading partners must have the necessary in-house staff capable of managing the network and must address a number of issues with each individual trading partner. Some of these issues are:

- Service Levels
- Communication Speeds
- Transmission Modes
- Modem Capabilities
- Line Protocols

Additionally, an EDI user electing to implement direct connections must be aware that not all trading partners will have similar capabilities and therefore the trading partner may by necessity elect to use a third party service.

6.4 Third-Party Services

Third-Party Services are those utilizing switched network technology and providing value added services. Switched networks connect and disconnect circuits as required to exchange data. The three common switched network methods are circuit switching, message switching, and packet switching.

Circuit Switching is used in public telephone systems. A circuit is dedicated between the source and destination for the duration of the transmission. The sender and receiver must be available at the same time.

Message Switching networks package the data in messages and pass the messages from switch to switch. The sender and receiver do not have to be available at the same time, since the message is stored at each intermediate step. For this reason, message switched networks are also referred to as store and forward networks.

Packet Switching is similar to message switching, but it divides the data into smaller, equal-sized pieces called packets. It takes less time to move data through the network, since large messages don't have to be stored at each intermediate switch. The reduced delay, over message switching, allows the two users to carry on a dialogue, referred to as an interactive process. In addition, the reduced delay aids transaction processing by moving the transactions to their designation quickly. The advantage of packet switching over circuit switching is that packet switching makes efficient use of the data lines. Each packet carries a destination address, so packets from multiple sources heading to different destinations can be transmitted down the same data line.

The above facilities and services may be obtained from commercial networks called Value Added Networks (VAN) rather than developed in-house. The commercial networks provide the network management and knowledgeable staff to support your communication requirements. Commercial networks now offer more than moving data from one site to another. Services provided include mailbox service, data storage, speed and format conversion, and translation.

Not all companies have the communication facilities to accommodate the multiple communication protocols that may be used by their potential trading partners. Third-party service providers eliminate the need for a Trading Partner to invest heavily in communication hardware, software, and personnel. A third-party service provider allows the convenience of a single data transfer link to multiple trading partners independent of operating schedules, protocol conversion, hardware interface, and conversion requirements.

When selecting a third-party service provider, a Trading Partner should evaluate the service capabilities and performance offered. Issues to consider include:

- C Speed of delivery
- C Dial out capabilities (e.g., auto-dial, scheduled)
- C Data integrity
- C Reliability
- C Job queuing options
- C Interconnect capabilities
- C Tracking and control reporting (audit, historical, and exception reporting)

Before data transfer begins with a third-party service, communications should be mutually defined and agreed upon. The use of third-party communications should be transparent to trading partners.

When establishing an EDI partnership, it is necessary to determine how the costs of third-party services will be apportioned. These costs are usually split equally between the trading partners. Costs associated with the use of a third-party service include:

- C Start-up charges
- C Mailbox fees
- C Connect charges
- C Data storage
- C Network interconnect
- C Character charges
- C Reports

6.5 Network Interconnects

Network interconnects are a viable means of exchanging data when each Trading Partner wishes to use their preferred VAN. It is the responsibility of each partner to research whether their preferred VAN has the full complement of desired interconnect capabilities with the other.

THIS PAGE LEFT INTENTIONALLY BLANK.